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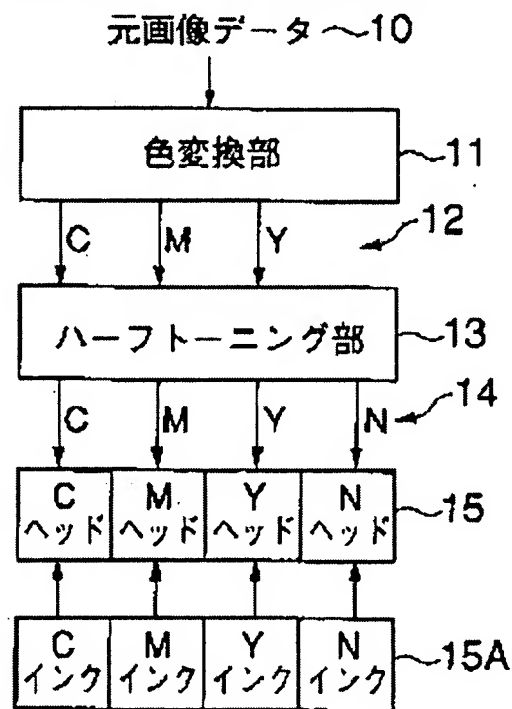
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(54) PRINT SYSTEM USING PIGMENT-BASED INK, PRINTING METHOD AND PRINTED MATTER

(57)Abstract:

PROBLEM TO BE SOLVED: To reduce unevenness of gloss on the surface of a printed matter using a pigment-based ink.

SOLUTION: The part where adhesion of ink varies abruptly is eliminated by suppressing an extremely bright or dark color of image data so that the lightness does not vary abruptly. Alternatively, reflectivity on the surface of a printed matter is brought close to that of ink by improving the ink material or the surface material of the printed matter. Alternatively, ink is rendered to be absorbed easily into the printed matter by atomizing the pigment particles of ink or making fine holes in the surface of the printed matter. Alternatively, transparent (N) ink or white (W) ink is applied to a white area applied with no colored ink of CMY. Alternatively, the print face is covered with a coat layer by spraying coating agent to the surface of the printed matter or pasting a coat film thereto. Alternatively, reflection of light is prevented by forming micro protrusions and recesses on the print face of the printed matter.



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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] This invention relates to amelioration of the print technique of using pigment system ink.

[0002]

[Description of the Prior Art] The digital printer which prints the image which consists of a dot of ink based on digital image data on print media is widely used as the peripheral device of a computer, a printer for digital cameras, etc. Improvement of the image quality of the print outputted by the digital printer is being enhanced, and especially the image quality of the print which an ink jet printer outputs came to be equal to the image quality of a film photo. The print by the printer is increasingly used for the application for which the film photo was conjointly used for improvement in such printing image quality of a printer, and improvement in the photography engine performance of a digital camera conventionally recently. For example, service of taking a photograph with a digital camera and printing with a digital printer conventionally even in the photo studio which exclusively supported the film photo is spreading. The advantage of making it circulate on the communication network where digital image data is easy a photo retouch etc. is also the factor by which a digital printer is liked.

[0003] One weak spot conventionally pointed out about the print by the digital printer, especially the object printed using color system ink was a point that lightfastness was low, as compared with the film photo. However, lightfastness has improved considerably by amelioration of ink or print media. According to the test result, especially the lightfastness of the print according to an ink jet printer using the latest pigment system ink exceeded 100 years at least, and has exceeded the film photo thoroughly. Therefore, the ink jet printer using pigment system ink will be widely utilized for the application which prints a high-definition photograph with a long life from now on.

[0004]

[Problem(s) to be Solved by the Invention] gloss with the surface whole region fixed [the print in a film photo or color system ink] when the print by the ink jet printer using pigment system ink and the print by the ink jet printer using a film photo or color system ink are seen with the naked eye and compared -- **** -- to being, although it is small, gloss nonuniformity exists in the front face of the print using pigment system ink. namely, -- if very dark body and shadow are in a very bright background in the print using pigment system ink or a very bright highlights spot etc. is in reverse in a very dark background (although the hit condition of an include angle or light to see is also depended) As for **** light, the part where lightness has changed suddenly like the border line of its very dark body, the whole shadow, or a very dark body and a shadow may be in sight by whether it is smaller than other fields. This slight gloss nonuniformity may give an impression unnatural a little to those who see.

[0005] Therefore, the object of this invention is to reduce the gloss nonuniformity of the front face of a print which used pigment system ink.

[0006]

[Means for Solving the Problem] The print system according to the 1st viewpoint of this invention is equipped with a means to amend the original image data so that sudden change of lightness may be prevented, and the means which prints using pigment ink based on the amended image data.

[0007] As opposed to the color data (1) with which said means to amend is included in the original image data with a suitable operation gestalt Bright section control which amends the lightness near the peak price of the range which lightness can take to the lightness below a predetermined upper limit (2) At least one side of dark space control ** which amends the lightness near the minimum value of the range which lightness can take to the lightness more than a predetermined lower limit is performed.

[0008] The print approach of following the 2nd viewpoint of this invention is equipped with the step which amends the original image data so that sudden change of lightness may be prevented and to amend, and the step which prints using

pigment ink'based on the amended image data.

[0009] The print media for the pigment system ink according to the 4th viewpoint of this invention has the countless micropore which absorbs the pigment particle contained in pigment system ink on the front face.

[0010] The print system according to the 5th viewpoint of this invention is equipped with a means to obtain the image data of the predetermined color coordinate system corresponding to the colored ink of a pigment system, and the means which prints by [as making transparent and colorless ink adhere to the field to which it does not adhere to the colored system ink of a printing intermediation body surface using transparent and colorless ink based on the image data of said predetermined color coordinate system as substantially as the colored ink of a pigment system] from the original image data.

[0011] The set of the ink cartridge according to the 6th viewpoint of this invention has the ink cartridge which stored the colored ink of a pigment system, and the ink cartridge which stored transparent and colorless ink substantially.

[0012] The step to which the print approach of following the 7th viewpoint of this invention obtains the image data of the predetermined color coordinate system containing the component color corresponding to the colored ink of a pigment system from the original image data, It has the step which prints by [as making transparent and colorless ink adhere to the field to which it does not adhere to the colored system ink of a printing intermediation body surface using transparent and colorless ink as substantially as the colored ink of a pigment system based on the image data of said predetermined color coordinate system].

[0013] The print system according to the 8th viewpoint of this invention is equipped with a means to obtain the image data of the predetermined color coordinate system containing the component color corresponding to the colored ink of a pigment system from the original image data, and the means which prints by [as making white ink adhere to the field to which it does not adhere to the colored system ink of a printing intermediation body surface using the colored ink and white ink of a pigment system based on the image data of said predetermined color coordinate system].

[0014] The set of the ink cartridge according to the 9th viewpoint of this invention has the ink cartridge which stored the colored ink of a pigment system, and the ink cartridge which stored white ink.

[0015] The print approach of following the 10th viewpoint of this invention is equipped with the step which obtains the image data of the predetermined color coordinate system containing the component color corresponding to the colored ink of a pigment system from the original image data, and the step which prints by [as making white ink adhere to the field to which it does not adhere to the colored system ink of a printing intermediation body surface using the colored ink and white ink of a pigment system based on the image data of said predetermined color coordinate system].

[0016] The print system according to the 11th viewpoint of this invention is substantially equipped with a wrap means for a means to print an image on the surface of print media using pigment system ink, and the front face of print media where said image was printed in a transparent and colorless coat layer.

[0017] The print according to the 12th viewpoint of this invention equips with a transparent and colorless coat layer the real target which covered the front face of print media where print media, the image which used pigment system ink for the front face of this print media, and was printed, and said image were printed.

[0018] The print approach of following the 13th viewpoint of this invention is substantially equipped with a wrap step for the step which prints an image on the surface of print media using pigment system ink, and the front face of print media where said image was printed in a transparent and colorless coat layer.

[0019] The coat equipment of the print according to the 14th viewpoint of this invention is equipped with a means to form a transparent and colorless coat layer in the front face of print media on which the image was printed substantially.

[0020] The print system according to the 15th viewpoint of this invention is equipped with a means to print an image on the surface of print media using pigment system ink, and the means which attaches countless detailed irregularity to the front face of print media on which said image was printed.

[0021] The print according to the 16th viewpoint of this invention is equipped with print media, the image which used pigment system ink for the front face of this print media, and was printed, and the countless detailed irregularity attached to the front face of print media on which said image was printed.

[0022] The print approach of following the 17th viewpoint of this invention is equipped with the step which prints an image on the surface of print media using pigment system ink, and the step which attaches countless detailed irregularity to the front face of print media on which said image was printed.

[0023] The surface treatment equipment of the print according to the 18th viewpoint of this invention is equipped with the means which attaches countless detailed irregularity to the front face of print media on which the image was printed.

[0024]

[Embodiment of the Invention] The cross-section model of the print by the ink jet printer with which color system ink was used for drawing_1 (A), and drawing_1 (B) show the cross-section model of the print by the ink jet printer which

used pigment system ink, respectively.

[0025] As shown in drawing 1 (A), color system ink 1 permeates the interior of print media (for example, paper) 2 good. On the other hand, as shown in drawing 1 (B), since pigment system ink 3 cannot permeate the interior of print media 2 easily, in the part (that is, part to which pigment ink 3 adhered very mostly) of a very dark color, the island of pigment ink 3 will be made by it on the front face of print media 2, and it will hide the texture of a bonnet printing intermediation body surface for a printing intermediation body surface thoroughly thickly. Surface 3a of the island of pigment ink 3 whose rate of a light reflex of surface 2a of the part of the very bright color which the texture of a printing intermediation body surface has exposed good is generally the part of a very dark color to low one has the relatively high reflection factor of the property of ink to light. Therefore, when surface 2a with the low rate of a light reflex and surface 3a with the high rate of a light reflex adjoin, it may be conspicuous and visible by the sensibility which the rate of a light reflex illuminated given the opportunity of surface 3a of a dark high part. Moreover, since surface 3b of the edge part (that is, part into which lightness has changed suddenly) of the island of pigment ink 3 leans, by the sensibility which only that carried out [*****] depending on the include angle to see or the include angle which light hits, it may be conspicuous and may be visible. It is guessed that the difference in such a rate of a light reflex on the front face of a print is the cause of the gloss nonuniformity of the print using pigment ink.

[0026] Some technique is offered in order that those who mitigate a difference of the rate of a light reflex in the front face of the print which used pigment ink, or look at a difference of the rate of a light reflex may make this invention be hard to be recognized. Those technique can be classified as follows.

[0027] (1) Soften sudden change of the rate of a light reflex of the front face of the print by processing an image and amending the concentration.

[0028] (2) Mitigate a difference of the rate of a light reflex by the coating weight of the ink of the front face of print media by improving the construction material of ink, or the construction material of the front face of print media.

[0029] (3) Mitigate a difference of the rate of a light reflex on the front face of a print by improving how using the ink for a concentration expression.

[0030] (4) Mitigate a difference of the rate of a light reflex by performing coating to a print front face.

[0031] (5) Mitigate a difference of the rate of a light reflex by machining on a print front face.

[0032] Using it independently can also use such technique, combining it suitably.

[0033] Hereafter, the operation gestalt of such technique is explained.

[0034] Drawing 2 shows the print structure of a system using the pigment system ink jet printer concerning 1 operation gestalt of the technique by the image processing of the above (1).

[0035] As shown in drawing 2, the image data 4 of origin like RGB full color image data is inputted into the color converter 5, and color-coordinate-system transform processing and lightness amendment processing which are mentioned later are performed here. The image data 6 outputted from the color converter 5 is inputted into the half toning section 7. The half toning section 7 is processing error diffusion or a dither to the inputted image data 6, and generates the bit map image data 8 which expressed substantially faithfully the multi-tone concentration of CMY each color which the input image data 6 has with the consistency of the dot of the ink of CMY each color and which was made binary, for example. The bit map image data 8 outputted from the half toning section 7 is transmitted to the print head 9. The print head 9 is forming the dot of pigment system ink on the surface of print media according to the bit map image data 8, and prints an image.

[0036] As mentioned above, the color converter 5 performs color-coordinate-system transform processing and lightness amendment processing to the inputted former image data 4.

[0037] Color-coordinate-system transform processing is a thing containing the component color corresponding to the color set of the pigment system ink which uses the color data of RGB color coordinates by printing, for example which is the former image data 4 changed into the color data of CMY color coordinate systems (or CMYK, CMYLCMLYK, etc.), for example.

[0038] Moreover, lightness amendment processing is performed before the above-mentioned color-coordinate-system transform processing, the back, or during color-coordinate-system transform processing, and the lightness (that is, value equivalent to L component when expressing color data by the Lab color coordinate system) which the color data which constitute the former image data 4 have is amended as follows there. That is, in this lightness amendment processing, color data with the very high lightness in former image data are corrected to color data with lower lightness (this amendment is hereafter called "bright section control"). Or in this color level amendment processing, color data with the very low lightness in former image data are corrected to color data with higher lightness (this amendment is hereafter called "dark space control"). The above-mentioned high lightness control and dark space control may perform only either, or both sides may be performed.

[0039] Drawing 3 shows the example of the input-output behavioral characteristics which the above-mentioned lightness amendment processing has. In drawing 3, the lightness (output lightness) in which the lightness (input

lightness) in which the color data of former image data have an axis of abscissa is shown, and, as for an axis of ordinate, the color data after amendment have it is shown. Lightness shall take the value of 0-255.

[0040] The curves a and b shown in drawing 3 are the examples of the I/O function which performs bright section control mentioned above, and change very high input lightness (for example, about 255 peak price) into output lightness lower than the predetermined upper limit A (for example, 250). Moreover, Curves c and d are what added the function of dark space control to the above-mentioned curves a and b, and change very low input lightness (for example, about zero minimum value) into output lightness higher than the predetermined lower limit B (for example, value 5).

[0041] By bright section control mentioned above, a very bright part like the highlights spot in a former image is corrected to a color [a little] darker than it. Moreover, the very dark part in a former image is changed into a color [a little] brighter than it by dark space control mentioned above. The lightness of the part where the lightness which existed in the former image changes suddenly by performing one side or the both sides of bright section control and dark space control is corrected so that it may change more nearly gently. therefore, in the front face of an output print, sudden change (that is, sudden change of the rate of a light reflex) of the coating weight of ink can soften, and it changes somewhat gently -- things -- ** the sensibility which is ***** carrying out the part where ink has adhered mostly as a result recognizes to people's eyes -- having -- being hard -- gloss nonuniformity is **** -- ** -- hard -- it becomes. A user is a manual, or the input-output-behavioral-characteristics curve for bright section control which was illustrated to drawing 3 , or dark space control has an automatic system, and you may enable it to adjust it according to the target image data.

[0042] Next, the operation gestalt of the technique by amelioration of the ink construction material of the above (2) or the quality of facing of print media is explained.

[0043] One operation gestalt is the printing approach using the ink in which the size of the particle of a pigment became very detailed at homogeneity. It is prevented that the island of ink 3 as the permeability to the print media of ink improved and shown in drawing 1 is made on a print front face according to the pigment particle contained in ink being very detailed, and gloss nonuniformity mitigates.

[0044] Another operation gestalt is the printing approach using the print media by which the countless micropore for absorbing the pigment particle of ink was formed in the front face. By this, the permeability to the print media of ink improves, it is prevented that the island of ink 3 as shown in drawing 1 is made on a print front face, and gloss nonuniformity mitigates.

[0045] Furthermore, another operation gestalt is the printing approach using ink which is a value near [the rate of a light reflex of the ink in the condition of having dried is lower than before, and] the rate of a light reflex of a printing intermediation body surface. Thereby, the gloss nonuniformity on the front face of a print by the difference in the coating weight of ink is mitigated.

[0046] Furthermore, it is the printing approach using print media which is a value near the rate of a light reflex of the ink in the condition of another operation gestalt having had the rate of a light reflex of a printing intermediation body surface higher than before again, and having dried. Thereby, the gloss nonuniformity on the front face of a print by the difference in the coating weight of ink is mitigated.

[0047] Next, the operation gestalt of the technique of having improved how using the ink for the color expression of the above (3) is explained.

[0048] Drawing 4 shows the print structure of a system using a pigment system ink jet printer concerning the operation gestalt which expressed color using ink [being substantially transparent and colorless (a notation "N" showing)] besides common colored ink like CMY.

[0049] As shown in drawing 4 , the image data 10 of origin like RGB full color image data is inputted into the color converter 11. The color converter 11 is changed into the color data of for example, a CMY (or CMYK, CMYLCLMLYK, etc. are sufficient) color coordinate system with the color component corresponding to the color set of the colored ink which uses the color data of RGB color coordinates by printing, for example which constitutes the inputted former image data 10. The image data 12 outputted from the color converter 11 is inputted into the half toning section 13. The half toning section 13 is processing error diffusion or a dither to the inputted image data 12, and generates the bit map image data 14 which expressed substantially faithfully the multi-tone (for example, 256 gradation) concentration of CMY each color which the input image data 12 has with the consistency of the dot of CMY each color ink and which was made binary, for example.

[0050] In addition to the CMY dot data in which the dot of CMY was shown, the half toning section 13 also generates N dot data in which the dot of transparent and colorless (N) ink was shown, when generating the bit map image data 14. According to these N dot data, when the dot of the colored ink of either C, M or Y is not struck, it will replace with the dot of that colored ink that is not struck, and the dot of N ink will be struck. Or according to these N dot data, N ink is made to adhere so that the hole of that colored ink may be filled to a bright field with little coating weight of colored

ink. The dot data of C, M, Y, and N mentioned above are contained in the bit map image data 14 outputted from the half toning section 13.

[0051] The bit map image data 14 outputted from the half toning section 13 is transmitted to the print head 15. The print head 15 has the set of four subheads which use the ink of C, M, Y, and N, respectively, and receives supply of the ink of C, M, Y, and N from set 15A of the ink cartridge (ink tank) of C, M, Y, and N. The print head 15 is forming the dot of the ink of C, M, Y, and N on the surface of print media according to the transmitted bit map image data 14, and prints an image.

[0052] Drawing 5 shows the cross-section model of the print outputted by this operation gestalt.

[0053] As shown in drawing 5, colored ink 17 adheres to the front face of print media 16, and also or colored ink 17 has not adhered, transparent and colorless (N) ink 18 adheres to a part with little the coating weight instead. Thereby, the coating weight of the ink in the front face of print media 16 becomes close to homogeneity, and a difference of the rate of a light reflex, i.e., gloss nonuniformity, reduces it.

[0054] Drawing 6 shows the print structure of a system using the pigment system ink jet printer concerning the operation gestalt which uses the white (a notation "W" shows) ink other than common colored ink like CMY, and expressed color.

[0055] As shown in drawing 6, the image data 20 of origin like RGB full color image data is inputted into the color converter 21. The color converter 21 is changed into the color data of for example, the CMYW (or CMYKW, CMYLCLMLYKW, etc. are sufficient) color coordinate system containing the color component corresponding to the ink set of C, M, Y, and W for example which constitutes the inputted former image data 20 and which uses the color data of RGB color coordinates by printing, for example. Here with the color data of a CMYW (or CMYKW, CMYLCLMLYKW, etc. are sufficient) color coordinate system that to which only W placed and changed into color data of 100% of concentration the color data all whose concentration of C, M, and Y is 0% -- or For example, it is color data which added the color component of W to the color component of C, M, and Y, and expressed the high color of especially lightness based on the principle that bright color can be made from mixing W pigment with other colored pigments like the color mixture technique of pictures, such as oil painting. That is, the usage of the ink by CMYW color coordinate systems (or CMYKW, CMYLCLMLYKW, etc.) is based on the principle of taking out brightness with using W ink positively, to being what is depended on the principle of taking out brightness with the usage of the ink of the conventional printer not using ink.

[0056] The image data 22 of the CMYW color coordinate system outputted from the color converter 21 is inputted into the half toning section 23. The half toning section 23 is processing error diffusion or a dither to the inputted image data 22 of a CMYW color coordinate system, and generates the bit map image data 24 showing the dot of CMYW each color ink made binary, for example. The bit map image data 24 outputted from the half toning section 23 is transmitted to the print head 25. The print head 25 has the set of four subheads which use the ink of C, M, Y, and W, respectively, and receives supply of the ink of C, M, Y, and W from set 25A of the ink cartridge (ink tank) of C, M, Y, and W. The print head 25 is forming the dot of the ink of C, M, Y, and W on the surface of print media according to the transmitted bit map image data 24, and prints an image.

[0057] According to this operation gestalt, in the field to which the colored ink of C, M, and Y on the front face of a print has not adhered, since W ink adheres instead, the coating weight of the ink in a printing intermediation body surface becomes close to homogeneity, and a difference of the rate of a light reflex, i.e., gloss nonuniformity, reduces it.

[0058] Next, the operation gestalt of the technique of performing coating to the print front face of the above (4) is explained.

[0059] Drawing 7 shows the print structure of a system using the pigment system ink jet printer concerning 1 operation gestalt by this technique.

[0060] As shown in drawing 7, print media 30 is intermittently sent towards the drawing Nakaya mark 32 with the paper feed rollers 31 and 31. The image is printed on the front face of print media 30 by injecting an ink droplet like an arrow head 34, and making it adhere to the front face of print media 30 in the intervals of paper feed, while the print head 33 runs near the front face of print media 30 in the direction which pierces through the space in drawing.

[0061] In the direction of paper feed, the coating head 35 exists in the lower stream of a river of the print head 33. The coating head 35 sprays the transparent and colorless coating agent in the uniform amount substantially [the shape of quick-drying liquid] on the printing side of print media 30, running near [which printing finished] the printing side of print media in the direction which pierces through the space in drawing. Or the coating head 35 is extended covering full [of print media 30], and sprays a coating agent on full [of the printing side of print media 30] in a uniform amount simultaneously. It dries promptly and the coating agent by which the fuel spray was carried out to the printing side of print media 30 forms the transparent and colorless coat layer which covered the printing image thoroughly.

[0062] In addition, in drawing 7, although the coating head 35 and the print heads 33 are the components according to

individual, the coating head 35 and the print head 33 are an integral part, and run together with carriage. moreover, the print which is another equipment which there is not necessarily no need for 35 coating head of being included in the same printer as the print head 33, and was separated from the printer, and was outputted from the printer -- a help -- or the coating head 35 is supplied automatically. Moreover, there is not necessarily no need for 35 coating head of being what sprays a liquefied coating agent. After spraying the powdery coating agent of heat solubility on print media, by heat treatment, may dissolve the powder coating agent, may stratify, and You generate the fog of a coating agent ultrasonically, may make it adhere to a printing intermediation body surface, and the fog of a coating agent may be made to stick to a printing intermediation body surface by electrostatic adsorption, you may be, a printing intermediation body surface may be soaked in the liquid of a coating agent, and various configurations can adopt [which plasters a printing intermediation body surface with a liquefied coating agent].

[0063] Drawing 8 shows the print system using the pigment system ink jet printer concerning another operation gestalt of the technique of performing coating.

[0064] In drawing 8, print media 30 is intermittently sent towards the drawing Nakaya mark 32 with the paper feed rollers 31 and 31 like drawing 7. The image is printed on the front face of print media 30 by injecting an ink droplet like an arrow head 34, and making it adhere to the front face of print media 30 in the intervals of paper feed, while the print head 33 runs near the front face of print media 30 in the direction which pierces through the space in drawing.

[0065] The roller devices 38 and 38 for sticking the transparent and colorless coated film 37 exist throughout the printing side of print media which printing finished with the lower stream of a river of the print head 33 in the direction of paper feed. These roller devices 38 and 38 pull out the coated film 37 which became roll-like, pile it up throughout the printing side of print media which printing of this finished, and they push both, applying heat from an outside. Substantially, a coated film 37 is a thermoplastic transparent and colorless synthetic-resin-for example, film, is being able to apply a pressure and heat, and serves as a coat layer which stuck to the printing side of print media and covered the printing image thoroughly.

[0066] in addition, the print which is another equipment which the need that the parts of a coated film 37 and the roller devices 38 and 38 are included in the same printer as the print head 33 does not not necessarily have, and was separated from the printer, and was outputted from the printer -- a help -- or the roller devices 38 and 38 are supplied automatically. A coated film 37 does not necessarily need to be a roll-like, and may be beforehand cut into required size.

[0067] Drawing 9 shows the cross-section model of the print outputted by drawing 7 or the operation gestalt of drawing 8.

[0068] Since the coat layer 42 on the front face of print media 40 has covered thoroughly the part to which ink 41 adhered, and the part which has not adhered and all the front faces of a print are the front faces of the coat layer 42 as shown in drawing 9, the rate of a light reflex is uniform and there is almost no problem of gloss nonuniformity.

[0069] Next, the operation gestalt of the technique of machining on the print front face of the above (5) is explained.

[0070] Drawing 10 shows the print structure of a system using the pigment system ink jet printer concerning this operation gestalt.

[0071] As shown in drawing 10, print media 43 is intermittently sent towards the drawing Nakaya mark 49 with the paper feed rollers 44 and 44. The image is printed on the front face of print media 43 by injecting an ink droplet like an arrow head 46, and making it adhere to the front face of print media 43 in the intervals of paper feed, while the print head 45 runs near the front face of print media 43 in the direction which pierces through the space in drawing.

[0072] The roller devices 47 and 48 for attaching countless detailed irregularity throughout the printing side of print media 43 which printing finished with the lower stream of a river of the print head 45 in the direction of paper feed exist. When it has countless detailed irregularity and print media 43 passes these roller devices 47 and 48, the surface whole region of the roller 47 which touches the above-mentioned printing side of these roller devices 47 and 48 forces the front face of a roller 47 by the pressure strong against the printing side of print media 43, and stamps that countless detailed irregularity throughout a printing side. It is small ** of extent sensed that light is reflecting the magnitude of this detailed irregularity irregularly substantially when people look at the printing intermediation body surface on which it was stamped by the eye (that is, it is visible like a semigloss side, without shining with ***** and others) (each concavo-convex diameter or width of face is 0.5mm or less extent). Various things, such as the shape of the shape of punctiform and stripes and ** and plaid, can adopt the configuration of each irregularity.

[0073] in addition, the print which is another equipment which there is not necessarily no need for 47 and 48 roller devices of being included in the same printer as the print head 45, and was separated from the printer, and was outputted from the printer -- a help -- or the roller devices 47 and 48 are supplied automatically.

[0074] Drawing 11 shows the cross-section model of the print outputted by the operation gestalt of drawing 10.

[0075] Since it has detailed irregularity that the front face of print media 50 of neither the part to which ink 41 adhered, nor the part which has not adhered is also flat, and countless as shown in drawing 11 and the light which hit this front

face is substantially reflected irregularly, that surface whole region looks like a semigloss side. Moreover, the island of ink 51 is also pushed and the height of a certain part and great difference to which ink 41 has not adhered is lost by being pushed in a grade into print media 50. Consequently, a difference of the rate of a light reflex of the front face of print media 50, i.e., gloss nonuniformity, decreases.

[0076] As mentioned above, although the operation gestalt of this invention was explained, this is the instantiation for explanation of this invention, and is not the meaning which limits the range of this invention only to this operation gestalt. Therefore, this invention can be carried out with other various gestalten, without deviating from the summary.

[Translation done.]